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RESPONSE UNDER 37 C.F.R. § 1.116
EXPEDITED PROCEDURE
GROUP 1731
Attorney Docket No. Q55086
PATENT APPLICATION

#18/BM
6302

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Hisashi WATANABE, et al.

Appln. No.: 09/361,118

Group Art Unit: 1731

Confirmation No.: 5143

Examiner: C. FIORILLA

Filed: July 27, 1999

For: ALUMINA SINTERED BODY AND PROCESS FOR PRODUCING THE SAME

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ATTN: BOX AF
Commissioner for Patents
Washington, D.C. 20231

Sir:

The Office Action of November 29, 2001, the period of response to which has been extended for three months by a concurrently filed Petition for Extension of Time and attached fee, has been received and its contents carefully considered.

Claims 1 to 8 have been rejected under 35 U.S.C. § 103(a) as obvious over Mohri et al in view of either Huang or Ali et al.

Applicants submit that these patents do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of this rejection.

The present invention relates to a process for producing a polycrystalline alumina sintered body which comprises the steps of preparing a slurry by subjecting alumina powder and a solvent to ultrasonic irradiation, mechanical stirring not using a grinding medium, or ultrasonic

irradiation and mechanical stirring not using a grinding medium, to provide a slurry of alumina dispersed in a solvent. The slurry is dried and formed to produce a green body. The green body is then sintered in an air atmosphere at a temperature in the range of 1400°C to 1800°C.

As set forth in claim 1, the alumina powder has a purity of 99.99 wt% or more, and comprises α alumina particles having substantially no fractured surface. Claim 1 sets forth specific properties for the alumina powder.

In essence, the Examiner has argued that Huang and Ali et al disclose mixing a slurry of powder and solvent by ultrasonic energy, and argues that in view of the teaching at column 6, line 31 of Mohri et al that the mixing in Mohri et al can be carried out in any conventional manner, it would have been obvious to employ an ultrasonic mixing to make the slurry in Mohri et al.

Both Huang and Ali et al disclose employing ultrasonic mixing to make a slurry. Applicants submit, however, that one of ordinary skill in the art would not have been lead to combining the teaching of these references with Mohri et al because they do not relate to the same art. In particular, according to Mohri et al, the main object of the invention is to provide an alumina composition which provides, on sintering, an alumina ceramic having wrap resistance and high dimensional precision. See column 2, lines 5-8. On the other hand, the object of the invention disclosed in Ali et al is to provide an improved packaging material for use with electronic devices, see column 2, lines 9-20. Ali et al is directed to making an alumina nitride/aluminum composite, and does not relate to making alumina slurries. Further, the invention disclosed in Huang is directed to a method for producing a sintered reaction bonded silicon nitride composite which is reinforced with silicon carbide whiskers, which contains

silicon nitride particles, or both. Thus, the Huang patent is directed to a silicon nitride composite containing silicon carbide whiskers or silicon nitride powders, and does not have anything to do with making alumina slurries.

With respect to applicants' argument that one of ordinary skill in the art would not have combined the teachings of Huang and Ali et al with those of Mohri et al because they do not relate to the same art, the Examiner argues that all of these references relate to ceramic materials. More particularly, the Examiner argues that the references relate to the mixing of slurries of ceramic materials and, therefore, they all relate to the same art, that is, the art of mixing ceramic slurries.

Applicants submit that this argument of the Examiner is not well founded because it is an over simplification to state that all of the references relate to the same art of mixing ceramic slurries. The references, in fact, relate to making different compounds by different reactions. Mohri et al relate to making an alumina composition, Ali et al relate to making an alumina nitrite/aluminum composite, and Huang relates to a silicon nitrite composite. Since the references relate to different compounds, applicants submit that they do not relate to the same art, and that one of ordinary skill in the art would not have been led to combining them.

The statement in Mohri et al that conventional mixing can be used refers to conventional methods of mixing alumina slurries. Mohri et al describe two such methods, namely, ball mill or a vibration mill, each of which involves a grinding. Thus, Mohri et al, at column 6, lines 30 to 32 and at lines 60 to 62, state that "Mixing of α -alumina and the other components can be carried out in a conventional manner, for example, by means of a ball mill or a vibration mill".

According to this description, a ball mill or a vibration mill are the conventional methods of

mixing α -alumina. Applicants submit that it was not conventional to mix alpha alumina by ultrasonic mixing.

With respect to applicants' argument that it was not conventional to mix alpha alumina by ultrasonic mixing, the Examiner asserts that arguments of counsel cannot take the place of evidence, and that the disclosure in Mohri et al of specific mixing processes do not limit the broad statement in Mohri et al that mixing can be carried out in a conventional manner.

In response, applicants submit that the burden is on the Examiner to show that it was conventional to mix alpha alumina by ultrasonic mixing, rather than on applicants to show that it was not conventional to mix alpha alumina by ultrasonic mixing. The Examiner has not provided any evidence to support his position that it was conventional to mix alpha alumina by ultrasonic mixing. Rejections cannot be based on unsupported assertions by the Examiner.

One of the purposes of employing the ultrasonic mixing in the present invention, as disclosed at page 10 of the present specification, is to reduce the formation of aggregates. The Huang patent, at column 3, lines 23 to 25, discloses that ultrasonic vibration breaks down agglomerates.

As described at page 10 of the present specification, the alumina powder used as a raw material in the present invention contains such small amount of agglomerates, and such uniform particle shape and particle size, that the alumina powder can be dispersed to form a uniform slurry only by irradiating with ultrasonic wave. It is also well known that the mixing methods using grinding media have higher energy to reduce the formation of agglomerates than an irradiation with ultrasonic wave. Thus, even if Huang discloses ultrasonic irradiation to reduce the formation of agglomerates, it does not mean that it is obvious to replace the mixing methods

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using the grinding media in Mohri et al with the ultrasonic mixing technique of Huang because Huang does not disclose or teach the alumina powder used in the present invention that contains small amount of agglomerates and has a uniform particle shape and the particle size recited in claim 1. Further, Huang merely discloses the use of an ultrasonic mixer.

With respect to applicants' argument that even though Huang discloses ultrasonic irradiation to reduce the formation of agglomerates, this disclosure does not mean it would have been obvious to replace the mixing methods using the grinding media in Mohri et al with the ultrasonic mixing technique of Huang because Huang does not teach the alumina powder employed in the present invention and merely discloses the use of an ultrasonic mixer, the Examiner argues that he is citing Huang for a teaching of a mixing method and not a teaching of the materials. The Examiner asserts that Mohri et al calls for conventional mixing, not grinding, and Huang clearly teaches a mixing technique.

Applicants submit that since Mohri et al describe that the conventional mixing is done by mixing techniques that employ grinding, applicants maintain that the conventional mixing in Mohri et al refers to mixing that employs grinding techniques.

In view of the above, applicants submit that there is no motivation to combine Mohri et al with Ali et al or Huang, much less to replace the mixing methods using the grinding media in Mohri et al with the ultrasonic mixing technique of Huang or Ali et al.

The Examiner further has stated that with respect to the recitation in the claims that the particles have substantially no fractured surface, that this recitation covers the presence of a single particle having no fractured surface. The Examiner has stated that "it is notoriously well

known in the art the during mixing or milling some particles are unchanged and thus no fractured surfaces exist”.

As regards substantially “no fracture surface”, applicants submit that the Examiner misunderstands the recitations of the present claims. According to the present invention, the particles having substantially no fractured surface are the alumina powder used as a raw material, and are not particles that have been mixed or milled in the steps that occur after the step of preparing the slurry. Thus, it is irrelevant whether some particles are unchanged during mixing or milling.

One of the features of the present invention is to use alumina powder comprising polyhedral particles having substantially no fractured surface. The alumina powder employed in the present invention mainly includes polyhedral powders having substantially no fractured surface. The presence of a single particle having substantially no fractured surface would not satisfy the recitations of the present claims.

By using such specific alumina powder as set forth in claim 1, applicants can achieve the present invention.

Additionally, by using alumina powder comprising particles having substantially no fractured surface, the alumina powder is prevented from secondary agglomeration in the steps after the step of preparing the slurry.

With respect to applicants’ arguments concerning the fact that applicants employ particles having substantially no fractured surface, the Examiner states that Mohri et al disclose, at columns 4 to 5, a method of preparing the alumina powder that is used in the Mohri et al process. The Examiner states that Mohri et al disclose that after these powders are prepared,

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there may be some instances where the powder are subjected to simple grinding, as disclosed at column 5, line 35. The Examiner states that this refers to the powder before the slurry is prepared.

In response, applicants submit that the disclosure at column 5, line 35 of Mohri et al does not satisfy the recitations of the present claims of employing a powder having substantially no fractured surface. Mohri et al, at column 5, line 35, do not state that these powders have substantially no fractured surface. Applicants submit that the burden is on the Examiner to establish that Mohri et al contain a disclosure of the use of powders of having substantially no fractured surface.

Further, in the experiments disclosed in Mohri et al, alumina powder was subjected to a ball milling. That is, alumina powder was dry blended, so that the alumina powder had fractured surfaces before preparing the slurry.

In view of the above, applicants submit that the cited prior art does not disclose or, suggest the use of an alumina powder having substantially no fractured surface.

In view of the above, applicants submit that the present invention is not obvious over Mohri et al in view of either one of Ali et al or Huang and, accordingly, request withdrawal of this rejection.

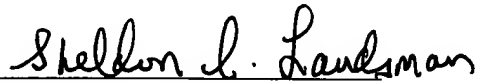
In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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